

AEROVOXTM
INDUSTRIES, INC.

51050
P. O. Box B-970
740 Belleville Ave.
New Bedford, Mass. 02741
617-994-9661

September 29, 1975

U.S. v. AVX Original Litigation Document

Mr. Jeffrey Miller
Director, Enforcement Division
Environmental Protection Agency
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Dear Mr. Miller:

As requested in Mr. Legro's letter of August 16, 1975, we have answered the questions to the best of our ability. In addition, the following information about our company and its use of Polychlorinated Biphenyl (PCB) may provide useful background and perspective.

Aerovox Corporation (now AVX Corporation) was a manufacturer of capacitors for approximately 50 years. In 1938 that company moved from New York City to New Bedford and housed its operation in a former textile mill on the shore of the Acushnet River, which is a tidal estuary at this point. The New Bedford operation manufactured several categories of capacitors including Paper, Paper Oil, Electrolytic and Mica Capacitors. In 1947 it commenced using Aroclor (which contains PCB's) as an impregnating fluid for paper oil capacitors because of the exception stability of this material and insurance company and building code requirements that flammable fluids are not allowed in capacitors used in building. These same qualities are still required to produce a dependable, safe and low cost capacitor. The early Aroclor compounds were not readily biodegradable, while subsequent compositions (including Aroclor 1016 which is currently used) are considerably more benign in this respect.

On January 1, 1973, Aerovox Corporation sold its New Bedford facility to a new group which was, for a brief period of time, known as Belleville Industries, Inc., and subsequently as Aerovox Industries, Inc. The new owners have shown a keen awareness of their environmental responsibilities and have instituted Aroclor containment and incineration procedures. A copy of this Aroclor Handling Procedure is enclosed for your information (See Exhibit A).

All Aroclor utilized at Aerovox Industries is purchased from the Monsanto Industrial Chemicals Co.; from January 1, 1971 to date that

usage has averaged in excess of 1,000,000 pounds per year, predominantly of the Aroclor 1016 composition. In addition, relatively small amounts of Aroclor 1254 are used, primarily in the impregnation of capacitors for the Acushnet Capacitor Company, and for the manufacture of D.C. capacitors used primarily by the U.S. military. Aroclor 1242 was used during 1971 before the more biodegradable 1016 became available.

The bulk of the Aroclor purchased leaves the plant in sealed metal cans in the form of finished capacitors being shipped to customers. These cans and covers are generally made of .015" steel although a small number are made of aluminum. The cans and covers are roll-sealed together with a cover-sealing compound material, and then impregnated with Aroclor through a small fill-hole. This fill-hole is then sealed with a silicone bung insert, or by soldering. These finished assemblies are subjected to high temperature tests to identify, cull out and reseal any leaking units. As a result, capacitors shipped into the field very seldom leak.

All Aroclor which drips off the units, the impregnation baskets and the degreasing baskets during the manufacturing cycle is caught in drip pans and stored in steel drums and accumulated for incineration. When a quantity in the order of 40,000 pounds is accumulated, it is shipped out by tank-truck to an incineration facility approved by the State of New Jersey. In the past three years, Aerovox sent out an average of more than 100,000 pounds of Aroclor per year for incineration. Prior to this time no Aroclor was sent out from this facility for incineration.

Sealed units that are rejected for various reasons are disposed of in an approved sanitary landfill site in New Bedford by a disposal contractor.

Aroclor also leaves this plant by the discharging (in suspension with cooling and sewage liquids) of extremely small quantities into the Acushnet River and the New Bedford sewer system. These small discharge amounts are unavoidably included in our cooling and sanitary liquid discharges and are in the low parts per billion level when combined with other liquid discharges. Based on analyses of both continuous and grab samples of our cooling water discharge, the amount of PCB's reaching either the Acushnet River or the city sewer system is so small as to be difficult to measure. This is due to the in-plant controls instituted under the enclosed Aroclor Handling Procedure and the increased concern of the new owners and management. All of our analytical work has been done by laboratories either at Monsanto, or at a Monsanto approved independent laboratory (Woodson-Tenent) in

Memphis, Tennessee. In several cases identical samples were analyzed by both laboratories and the parts per billion (PPB) findings were compatible.

The specific answers to your questions are as follows:

1. Not applicable
2. a) Aerovox Industries sole product is capacitors which are used in a wide variety of electrical applications ranging from ballasts used in fluorescent light circuits to atomic energy research. Each capacitor is a closed system that has no inherent means of dispersing impregnating fluids into the environment.

The physical size of the product ranges from units of approximately 1 cubic inch to units of 5,000 cubic inches. There are also wide variations in capacitance and voltage ratings of the units.

- b) The following table shows the estimated total amounts of Aroclor 1242, 1016 and 1254 which have been incorporated into our product for the years 1971, 1972, 1973, 1974 and for the first 6 months of 1975. This table was compiled from records of Aroclor purchases, capacitor production and the incineration of scrap Aroclor. Because numerous recordkeeping changes preceded and followed the advent of Aerovox Industries on January 1, 1973, it has been necessary to some degree to interpolate and extrapolate from the documents available, making every effort to maintain arithmetic integrity in the process.

SOURCE DERIVATION FOR 2B TABLE

- 1) Aroclor Purchases - obtained from Purchasing records.
- 2) Inventory adjustments are based on physical inventories at, or closest to, end of each period. (See attached Exhibit B).
- 3) Scrapped unit Aroclor weight is based on reject test data for 1973, 1974 and 1975; estimated for years 1971 and 1972. Number of units scrapped is extended by the Aroclor content of representative units in each size category. Aroclor content is obtained from bill-of-material specifications. (See attached Exhibit C illustrating how 1973 figures were obtained).

TABLE 2b

AROCLOR 1242 and 1016

	<u>AROCLOR 1242</u>	<u>1971</u>	<u>AROCLOR 1016</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>Jan-June</u>
os.		940800.		1662800.	1839800.	2005200.	362700.
Inventory Change		<u>81786.</u>	(<u>54300.</u>	<u>27960.</u>	(<u>83760.</u>	<u>90720.</u>
ilable		<u>1022586.</u>		<u>1608500.</u>	<u>1867760.</u>	<u>1921440.</u>	<u>453420.</u>
capacitors sold		947493.		1473772.2500	1727536.9000	1760955.1611	419437.
capacitors scrapped		20604.		49484.	64725.	82832.	16266.
incineration		54431.		85193.	75457.	77620.	17706.
sewer system		1.6739		1.5648	1.3135	1.1958	.
river		<u>56.4436</u>		<u>49.1852</u>	<u>39.8800</u>	<u>31.6431</u>	<u>9.</u>
ounted for		<u>1022586.</u>		<u>1608500.</u>	<u>1867760.</u>	<u>1921440.</u>	<u>453420.</u>

AROCLOR 1254

os.		97800.		None	7200.	14400.	None
Inventory Change	(<u>5506.</u>)	<u>5306.</u>	(<u>6513.</u>	<u>363.</u>	<u>2063.</u>
ilable		<u>92294.</u>		<u>5306.</u>	<u>687.</u>	<u>14763.</u>	<u>2063.</u>
capacitors sold		87097.7540		5018.4600	505.6147	14086.7478	1964.
capacitors scrapped		276.		6.	37.	74.	18.
incineration		4915.		281.	28.	602.	80.
sewer system		.1511		.0052	.0005	.0092	.
river		5.0954		.1628	.0148	.2430	.
ACU-CAP		<u>None</u>		<u>.3700</u>	<u>116.3700</u>	<u>None</u>	<u>None</u>
ounted for		<u>92294.</u>		<u>5305.9980</u>	<u>687.</u>	<u>14763.</u>	<u>2063.</u>

- 4) Pounds of Aroclor incinerated have been obtained from Purchasing records (See attached Exhibit D). The actual incineration dates of course lag the accumulation of material to be incinerated.
- 5) Discharges of Aroclor to the New Bedford sewer system are based on the estimated total gallons discharged at the 6 PPB level determined by Monsanto analysis on 12/5/74. (See Exhibit F-2).
- 6) Aroclor discharges to the Acushnet River are based on the estimated total gallons of water discharged at 16.5 PPB level in 1974 and 9.26 PPB in 1975 as determined from continuous samples on 12/4 and 12/5, 1974 and 9/4/75. (See attached Exhibits E & F).
- 7) Aroclor in "ACU-CAP" (tenant) impregnation cycles are based on impregnation records and bill-of-materials Aroclor weight for impregnated units. (See attached Exhibit G).
- 8) Pounds of Aroclor incorporated into product is based on the balance remaining after all known other deductions are made from total Aroclor available (See Table 2b).

2. (c) All Aroclor used at Aerovox in the years 1971 thru mid-1975 was purchased from Monsanto Industrial Chemicals Co. in St. Louis, Missouri. The amounts of Aroclor #1242, #1016 and #1254 obtained from Monsanto during the 4 1/2 year period requested are as shown on our Table (see 2b).

(d) Aerovox uses Aroclor in the U.S. only at its 740 Belleville Avenue, New Bedford, Massachusetts plant. Its total domestic output is distributed from New Bedford, Mass.

(e) Capacitors are classified as industrial consumer products since they usually are components in such products as television sets, home air conditioning units, microwave ovens, fluorescent lights, high-intensity lighting, and other similar applications.

The total production by Aerovox of capacitors utilizing Aroclor as an impregnating fluid has been as follows:

1971	3,766,727 units
1972	8,346,636 "
1973	9,934,220 "
1974	11,783,515 "
1975 (6 months)	4,587,435 "

The total number of Aerovox customers has been as follows:

1971	214
1972	214
1973	403
1974	369
1975 (6 mos.)	252

3. (a) In 1972 and 1973 Aerovox used Aroclor to impregnate a small quantity of capacitors for the Acushnet Capacitor Co. located at 740 Belleville Avenue, New Bedford, Mass. This amounted to .37 lbs. of #1254 Aroclor in 1972 and 116.37 lbs. in 1973. (See Exhibit G). This material was purchased from Monsanto.
4. (a) Aerovox has never reclaimed any Aroclor, or had it reclaimed by anyone else. Aerovox is currently setting up a "clean" collection process that may result in reclaiming a substantial portion of the Aroclor which would otherwise be incinerated.
5. (a) Aerovox disposes of Aroclor by having "dirty" material incinerated at an EPA-approved facility, and by disposing of scrap in approved landfill areas.

(b) Pounds of Aroclor incinerated were as follows:

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u> (6 mos.)
Aroclor 1016	None	139,624#*	None	85,448	89,163
Aroclor 1254	None	5,196#	None	630	80

Pounds of Aroclor contained in scrap units disposed of in approved landfill areas were as follows:

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u> (6 mos.)
Aroclor 1242	20,604#	None	None	None	None
1016	None	49,484#	64,725#	82,832#	16,266#
1254	276	6	37	74	18

*This poundage classified as 1016 although some portion was actually 1242. Our records did not differentiate between compounds.

5. (c) Incineration of Aroclor has been by...

Chemtrol Pollution Services
P.O. Box 200
Model City, New York 14107

at its disposal site at 1550 Balmer Road in Model City,
N.Y. (144,830 lbs. in 1972).

Rollins Environmental Services, P.O. Box 221, Bridgeport,
New Jersey, 08014, incinerated at its disposal site in
Bridgeport, New Jersey 86,078 lbs. in 1974; 89,243 lbs.
in the first 6 months of 1975.

Burgess Trucking Co. (John F. Burgess), 11 George St.,
New Bedford, Mass. disposed of 20,880 lbs. of Aroclor
contained in scrap capacitors in the City of New Bed-
ford sanitary landfill site in 1971.

ABC Disposal Co., 246 Clifford Street, New Bedford, Mass.
disposed of Aroclor contained in scrap capacitors in the
City of New Bedford sanitary landfill site as follows:

1972	49,490 lbs.
1973	64,762 "
1974	82,906 "
1975 (6 mos.)	16,284 "

6. (a) The PCB compounds used from January 1, 1971 to date have
consisted of Aroclor 1242, 1016 and 1254. All compounds
have been purchased from Monsanto Industrial Chemicals
Company of St. Louis, Missouri.

7. (a) All sampling and analysis on behalf of Aerovox has been
done by approved analytical laboratories and by accepted
sampling procedures. The results have, nevertheless,
varied widely. These variations may be attributable to
the very low parts-per-billion involved, to possible
variations in the PCB levels during the sampling and to
possible variations in analytical techniques.

1. PCB discharges into waters of the United States
(the Acushnet River) have been analyzed as follows:

<u>Date</u>	<u>Laboratory</u>	<u>Parts Per Billion</u>	<u>Composite</u>
Approx 4/74	Monsanto (Sauget, Ill)	13.2	Grab
9/24/74	Woodson-Tenent (Memphis, TN)	3.84	Grab

<u>Date</u>		<u>Laboratory</u>	<u>Parts Per Billion</u>	<u>Composite</u>
12/4 & 12/5/74	18 Hr. Composite Sample	Woodson-Tenent (Memphis, TN)	11.1	Composite
		Monsanto	19.7	"
		New England Analytical & Testing Lab (Natick, Mass.)	18.7	"
12/5/74		Monsanto	55.3	Grab
9/4/75	8 Hr. Composite Sample	Woodson-Tenent	2.01	Composite

Note: 16.5 PPB (the average of three composite samples) was used for our estimate of PCB discharges into the Acushnet River in 1974. 9.26 PPB (average of 16.5 and 2.01) was used for our estimate of PCB discharge into the Acushnet River in 1975. (See Table 2b & Exhibit E & F).

Discharges into publicly owned treatment works have been analyzed as follows:

<u>Date</u>	<u>Laboratory</u>	<u>PPB</u>	<u>Sample Type</u>
9/24/74	Woodson-Tenent	54.4	Grab
12/5	Monsanto	5	Grab
12/5	Monsanto	6 *	Grab

*Note: 6 PPB was used for our estimate of PCB discharges into the City Sewer System (See Table 2B & Exhibit E & F)

7. (b) The flow into waters of the United States and the publicly owned treatment works has been estimated from our actual purchases of water from the City of New Bedford with deductions made as shown on our Exhibit E.

Estimated Flow into The Acushnet River

1971	769,294 gallons per day
1972	681,996 " " "
1973	605,021 " " "
1974	635,050 " " "
1975 (6mos)	680,812 " " "

Estimated Flow into City Sewer System

1971	75,000 gallons per day
1972	70,000 " " "
1973	65,000 " " "
1974	65,000 " " "
1975 (6 mos)	65,000 " " "

7. (c) Following is a summary of PCB analysis results for various points in the Acushnet River watershed and upstream and downstream from Aerovox.

<u>Date</u>	<u>Location</u>	<u>PPB</u>	<u>Type of Sample</u>
5/29/75	Watershed (Little Quittacas Pond)	1.07	Grab
7/11/75	Hamlins Pd (Acushnet River-Fresh Water)	.127	Grab
8/25/75	Acushnet Saw Mills (Fresh Water)	.657	Grab
8/25/75	Upstream (Salt Water)	.538	Grab
7/11/75	Middle of river opposite Aerovox	12.7	(Slacktide)
7/11/75	" " " " "	9.44	(High Tide)
7/11/75	" " " " "	9.67	(Low Tide)
8/25/75	" " " " "	.521	(Slacktide)
9/9/75	" " " " "	.24	(Slacktide)
8/25/75	Coggeshale St. Bridge (1 mile downstream)	.888	(Slacktide)
8/25/75	Fairhaven Bridge (3 miles downstream)	1.19	
8/25/75	Hurricane Barrier (4 miles downstream)	1.25	
8/31/75	Buzzards Bay Shipping Channel (Approx 12 miles from Aerovox)	.01	

Note: See attached Exhibit H which confirms Buzzards Bay analysis.

8. (a) Aroclor is transported to the New Bedford railyards in tank cars from the Monsanto Industrial Chemicals Co. in Sauget, Illinois. The Aroclor is transferred to an Aerovox-owned tank truck in the railyard and transported approximately 2 miles to the Aerovox plant where it is pumped into storage tanks inside the building. Aroclor is shipped out for incineration in tank trucks belonging to the incinerator. Dirty Aroclor is shipped in sealed drums on an Aerovox truck from Aerovox Canada Ltd. in Nova Scotia to New Bedford for incineration in the U.S.
- (b) Known transporters are:
 1. Penn Central Railroad (home address not known)
 2. Adams Trucking Co.; 562 Acushnet Avenue, New Bedford, Mass. which supplies a tractor to pull the Aerovox tank truck to and from the railyard.
 3. Chemtrol Pollution Services
P.O. box 200
Model City, NY 14107
For the transporting of Aroclor to incineration facility
 4. Rollins Environmental Services
P.O. Box 221
Bridgeport, NJ 08014
 5. R.S. & B. Truck Leasing Co.
29 Morton Avenue
North Dartmouth, Mass.
Have transported six 55 gallon drums from our Amherst, Nova Scotia plant to New Bedford.
9. There are no spills involving PCB's that we are aware of.
10. Aerovox does not know of any adverse effects on health resulting from the introduction of PCB compounds into the environment. Aerovox is aware of news reports alleging adverse health and environmental effects of PCB's, e.g., the Yusho disease in Japan.
11. Aerovox uses PCB compounds in capacitors and has information on the use, discharge and disposal of PCB.

USE

Aerovox changed from Aroclor 1242 to the more biodegradable Aroclor 1016 in September 1971 (small quantities of Aroclor

1254 had been used but purchase of this material was discontinued in August, 1975). Based on extensive life testing, Aerovox reduced the amount of PCB in a capacitor by reducing the amount of paper and the size and cross-section of the capacitor.

Aerovox is phasing into production silicone rubber seals which minimize the possibility of a leaking capacitor both at the plant and in the field.

Aerovox has an active program to develop a replacement for PCB in capacitors. This two pronged program is directed, on the one hand, to finding a liquid to replace PCB as the impregnant and, on the other hand, to developing a plastic film capacitor that does not require a PCB impregnant.

Aerovox has evaluated many dielectric fluids and, in 1974, introduced "Environol", a non-PCB impregnant for paper capacitors. Environol does not have the fire-resistant characteristics of PCB and Environol-impregnated capacitors cannot operate at the high temperatures required in many lighting applications. Aerovox continues to search for a dielectric liquid to replace PCB as a paper capacitor impregnant.

The plastic film program is exploring two different types of capacitor construction: the film and foil design with a liquid impregnant and a dry metallized polypropylene design. The film/foil design employs Mylar plus a non-PCB impregnant. Because of internal heating associated with this film, this design is only suitable for small capacitors. Even with small capacitors the non-PCB impregnants burn and have a very short life at elevated temperatures.

The metallized polypropylene design has been used extensively in England and Italy for over five years. Aerovox personnel have made numerous visits to Europe to gather information about this design from capacitor manufacturers, material vendors and equipment manufacturers. Extensive life tests have been conducted on metallized polypropylene capacitors manufactured in Europe. Aerovox is developing these capacitors under license from Pye TMC of Canterbury, England. The metallized polypropylene capacitor is, however, voltage-limited and shows a drop in capacitance during life especially under over-voltage conditions.

At this time, therefore, there is no direct replacement for PCB impregnated paper or paper/film capacitors.

DISPOSAL

Aerovox participated in ANSI committee C107.1 for the development of standard guidelines for handling and disposal of PCB. These guidelines have been incorporated into Aerovox process specifications. High temperature incineration is used to dispose of liquids and a sanitary landfill is used in disposal of scrap capacitors.

DISCHARGE

Over the past four years, Aerovox has made many improvements in order to minimize the discharge of PCB's.

- . Relocated the capacitor sealing area from the third floor to the second floor in order to reduce to a minimum the distance the PCB containing capacitors were transported in the plant prior to sealing and cleaning.
- . Installed a system to pump liquids from drainage sumps throughout the plant into a large settling tank to separate PCB from the water.
- . Installed catch basins under holding racks to collect PCB's for reprocessing and reuse.
- . Improved housekeeping in the handling of PCB to minimize spills and discharge of PCB.
- . Initiated an analytical program to monitor the discharge of PCB in plant effluent.

Please let us know if you have any further questions.

Very truly yours,

AEROVOX INDUSTRIES, INC.



Norman Butterworth
Manager of Environmental Control

NB/eb

cc: Mr. Stanley W. Legro